

✓

UK Patent Application GB 2 335 105 A

(43) Date of A Publication 08.09.1999

(21) Application No 9816175.5	(51) INT CL ⁶ H04N 5/272 7/18
(22) Date of Filing 25.07.1998	(52) UK CL (Edition Q) H4F FAAG FD1B9 FD12X FD2B FD30K FGH
(71) Applicant(s) Loyaltop Ltd (Incorporated in the United Kingdom) Unit 2, Bayley Street Industrial Estate, Stalybridge, CHESHIRE, SK15 1PU, United Kingdom	(56) Documents Cited GB 2220638 A GB 2270605 A GB 2242592 A GB 2235347 A WO 90/10251 A1
(72) Inventor(s) Lawrence Pringle	(58) Field of Search UK CL (Edition P) H4F FAAG FGH FGJ FGT INT CL ⁶ H04N 5/00 5/222 5/262 5/272 7/00 7/18 9/00 9/64 9/74 9/75 Online:WPI, EPDOC
(74) Agent and/or Address for Service Appleyard Lees 15 Clare Road, HALIFAX, West Yorkshire, HX1 2HY, United Kingdom	

(54) Abstract Title
Composite image production

(57) An intermediate image is formed by joining a subject image of a subject (20) with a physical background (21) to a virtual background (31) selected to visually match the physical background (21). A final composite image is formed by combining a foreground image section (30) such as a cut out image of an animal, character or personality, with the enlarged intermediate image.

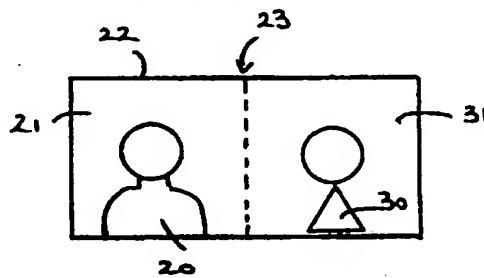
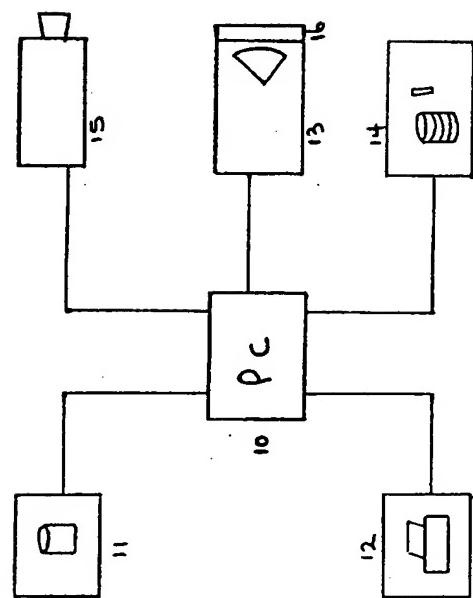
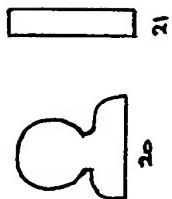


FIG 4

GB 2 335 105 A

1

FIG



2 / 2

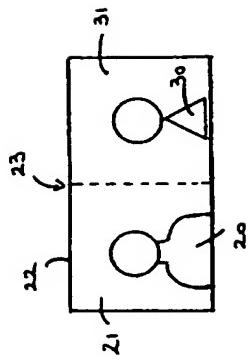


FIG. 2

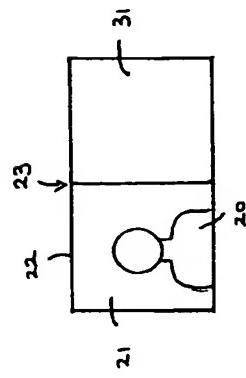


FIG. 3

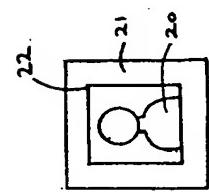


FIG. 2

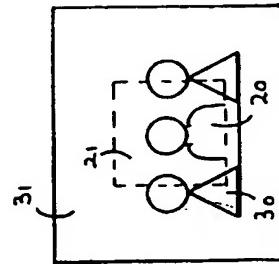


FIG. 4

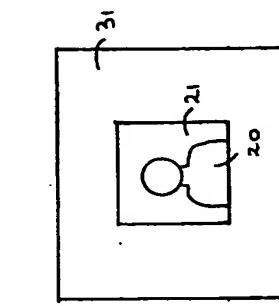


FIG. 6

FIG. 5

2335105

- 1 -

COMPOSITE IMAGE METHOD AND APPARATUS

The present invention relates in general to the field of composite images, and in particular to a photobooth apparatus.

A photobooth apparatus is typically provided in a public location such as an airport or railway station enabling a user to produce passport sized photographs of themselves, following operation of a payment mechanism receiving coins, notes or other payment. A typical photobooth machine comprises a camera arranged to be directed in use toward a user before a physical background such as a curtain across a rear wall of the booth. Any suitable camera may be used but most recently digital imaging cameras are preferred producing an electronic data representation of the subject image. Typically, a physical output of the image is provided to the user, for example by being printed or by known photographic processing techniques, to provide the user with a resultant output image.

In addition to producing passport type photographs of the subject, it is desired to improve the attractiveness and usability of the photobooth machine by offering additional photograph features. In particular, it is desired to produce a composite image of the subject and a character image representing, for example, a popular personality such as a footballer or pop singer.

According to the present invention there is provided a composite image apparatus for use in a photobooth, comprising: camera means for forming a subject image of a subject with a physical background; image processing means

- 2 -

for forming a composite image by laying a foreground image section over said subject image; and image output means for producing a visual output of the composite image.

5 The composite image apparatus is preferably formed within a photobooth. The camera means is preferably arranged to be directed toward a user of the photobooth as a subject before a predetermined physical background. Suitably, the photobooth is provided with a subject area allowing the user 10 to position themselves, for example on a seat, in a predetermined position within a controlled lighting environment using screens such as curtains to the side and optionally behind the subject.

15 The image processing means suitably comprises means for selecting a virtual background appropriate to the physical background. In the preferred embodiment the physical background is selected to be a uniform surface of a known colour, and the virtual background is selected to visually 20 match the physical background, for example by being approximately the same colour. Preferably, the virtual background is selected to have optical characteristics, such as colour and texture, similar to the physical background.

25 Suitably, the image processing means comprises means for forming an intermediate image by joining one or more boundaries of the subject image with the virtual background. Conveniently, joining the subject image to the virtual background creates an enlarged image area. In a first 30 embodiment, a subject image is formed having a substantially rectangular outline and one edge, preferably a side edge, of the subject image is joined to a corresponding side edge of the virtual background.

- 3 -

The joining means preferably operates on data representing the subject image and on data representing the virtual background, which may be stored in any suitable data format. Preferably, the joining means joins the subject image to the virtual background by colour matching adjacent pixels along a boundary line.

In a second embodiment the subject image is joined along more than one boundary to the virtual background. 10 Conveniently a rectangular subject image is joined by two, three or four boundaries to the virtual background according to the size of field required in the eventual composite image. Where the subject image is joined along all boundaries, ie.. along all four sides of the rectangular 15 image, the subject image is effectively placed within the virtual background.

The image processing means suitably produces a composite image by super imposing said foreground image section over 20 the intermediate image formed by joining the subject image to the virtual background image. The foreground image may take any suitable form, and conveniently is a cut out image of a popular personal character. In this way, a composite image is formed containing both the subject against the physical 25 background, expanded to include the virtual background, and the foreground image against this intermediate image.

In a first preferred embodiment the foreground image section is applied over only the virtual background. That 30 is, the subject appears before the physical background and the foreground character image appears before the virtual background, with the intersection between these two images along a boundary line joined as described above to provide

- 4 -

the appearance of a continuous single image in the composite image.

5 In a second preferred arrangement suitable for, for example, a foreground image containing a group of characters such as the members of a pop group, the foreground image is applied over any desired portion of the intermediate image, ie. over the subject, over the physical background or over the virtual background, or any combination of these. In this
10 way the subject is combined closely with the foreground image to form a attractive composite image. The apparatus preferably comprises user input means for enabling the user to position the foreground image with respect to the intermediate image. Conveniently, the user input means is a
15 touch screen monitor or other suitable use input device.

The image output means displays the composite image in any suitable form. The image may be displayed temporarily such as on a CRT monitor, or output in permanent form using
20 any suitable printing device.

For a better understanding of the invention, and to show how embodiments of the same may be carried into effect, reference will now be made, by way of example, to the
25 accompanying diagrammatic drawings, in which:

Figure 1 is a schematic view of a preferred embodiment of the composite image apparatus;

30 Figures 2-6 are schematic representations illustrating the preferred method and apparatus for producing a composite image.

- 5 -

As shown in figure 1 the preferred apparatus comprises a central control unit 10 having data storage such as a hard disc 11 and a permanent visual output such as a printer 12, a temporary visual output such as a monitor 13, a payment mechanism 14, a camera 15 and a user interface such as a touch screen 16 of the monitor 13.

The apparatus is preferably mounted within a housing of a photobooth with the camera 15 directed toward a subject 20 arranged in front of a known background 21. Suitably the monitor 13 and the user input means such as the touch screen 16 are located convenient for the user when in the position of the subject 20. The photobooth may take any suitable form with arrangements for positioning the subject relative to the camera 15 such as a height adjustable seat and/or arrangements for positioning the camera 15 with respect to the subject 20 for example by moving the camera or by moving the optical path such as by tilting a mirror.

In the preferred method of operation the subject 20 inserts payment into the payment mechanism 14 for example by inserting coins or a credit card to release activation of the apparatus. The user adjusts their relative position with respect to the camera 15 suitably by looking at live images from the camera 15 on the monitor 30 until an acceptable subject image is achieved. The camera 15 is suitably a digital camera, or alternatively a combination of motion and still picture cameras may be employed.

The user controls may take any suitable form, for example buttons or a joystick, or suitably a touch screen 16 for the monitor 13.

- 6 -

In common with typical photobooth arrangements the subject 20 is photographed against a background 21 suitably mounted on the rear wall of the photobooth. The background 21 is preferably uniformly lit, for example in the form of a 5 backlit semi-transparent or translucent screen.

In the preferred arrangement the background 21 is a known colour or colours. For example, the background is selected to be a single uniform colour over at least the area 10 visible to the camera 15, or alternatively the background 21 may be a background scene having a known colour or colours particularly at edge portions thereof.

Conveniently the apparatus operates in a passport mode 15 to produce a output image for example using a colour printer 12 or photograph image developer showing the subject 20 before the background 21, responsive to user controls following payment using the payment means 14.

20 As shown in figure 2 the subject 20 is photographed in front of the physical background 21 to produce a subject image. The subject image is processed as will be familiar to the skilled person, for example to produce a cropped image within a predetermined frame 22. The subject image is output 25 to the printer 12 in the first operating mode as a passport type photograph, typically with four images being produced in a strip.

30 In a second operating mode it is desired to produce a composite image showing the subject 20 together with an additional foreground image such as an animal, a cartoon, or a person. This second embodiment will now be described in more detail with reference to figures 2 through 6.

- 7 -

In the second mode the user selects, such as by using input means 16, a foreground subject such as a popular footballer from amongst a predetermined selection displayed on the monitor 13.

5

Where the foreground subject is determined to be of a first type, for example corresponding to a single character or person, a first composite image is formed as shown in figures 3 and 4. In this embodiment the foreground image is desired to be shown adjacent one side of the subject image, for example to the left or to the right as shown in figure 3.

10 Referring to figure 3 the subject image 2 is joined to a virtual image 3 to produce an intermediate image. The background of the virtual image 31 is selected to match the physical background 21 of the subject image 2. That is, the subject image 2 and the virtual image 3 are joined along one edge 23 of the subject image 2, suitably by merging pixels of each image at common joining points to produce an integrated picture. Where the physical background 21 is a single colour the virtual background 31 is selected to be a closely matching single colour and the join 23 merged by altering colour values of pixels in the subject and in the background to produce a smooth transition from the subject background to the virtual background 31. Similarly, where the physical background 21 represents a landscape scene the virtual background 31 can optionally represent a corresponding part of the background scene or a complementary type background scene. The join 23 is again masked to integrate the subject background 21 with the virtual background 31.

15

20

25

30

- 8 -

As shown in figure 4, the foreground image 30 is positioned at any desired location against the virtual background 31 to form the final composite image.

5 Referring now to figure 5 a second option is shown suitable for use when the subject is desired to be combined with a large image such as a group of persons. In this embodiment the subject image 2 is joined along two, three, or as shown, four edges to a virtual background 3, and the join
10 blurred or matched as described above. The field of view of the combined intermediate image is represented by the combined area of subject image 21 and the virtual background 31 and is selected according to the size of image field required in the final image. As shown in figure 6 the
15 foreground image 30 such as the members of a pop group are positioned over the intermediate image either automatically or under user control until a desired combination is achieved. The resultant composite image showing the subject 20 combined with the foreground 30 against the real and
20 virtual backgrounds 21, 31 is printed using printer 12 under the control of the PC 10.

Conveniently the foreground images are held in electronic form by suitable storage device such as hard disc
25 drive 11 of figure 1. The foreground images are readily changed and updated according to the preferences of the users of the photobooth. Suitably the foreground image is stored as a cut out with the foreground image separated from a background in a pre-processing stage.
30

The method and apparatus described above have many advantages, enabling a composite image to be produced quickly and simply with minimal processing. In particular there is

- 9 -

no requirement for the subject 20 to be isolated from the physical background 21. Instead, realising that in a composite photograph it is the subject and the foreground image that are of greatest importance to the user, the 5 physical background 21 is matched with a corresponding virtual background to produce an acceptable composite image.

The reader's attention is directed to all papers and documents which are filed concurrently with or previous to 10 this specification in connection with this application and which are open to public inspection with this specification, and the contents of all such papers and documents are incorporated herein by reference.

15 All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or 20 steps are mutually exclusive.

Each feature disclosed in this specification (including any accompanying claims, abstract and drawings), may be replaced by alternative features serving the same, equivalent 25 or similar purpose, unless expressly stated otherwise. Thus, unless expressly stated otherwise, each feature disclosed is one example only of a generic series of equivalent or similar features.

30 The invention is not restricted to the details of the foregoing embodiment(s). The invention extends to any novel one, or any novel combination, of the features disclosed in this specification (including any accompanying claims,

- 10 -

abstract and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.

- 11 -

CLAIMS

1. A composite image apparatus for use in a photobooth, comprising:

5 camera means for forming a subject image of a subject with a physical background;

10 image processing means for forming a composite image by laying a foreground image section over said subject image; and

image output means for producing a visual output of the composite image.

15 2. A composite image apparatus as claimed in claim 1, wherein said image processing means comprises means for selecting a virtual background appropriate to said physical background.

20 3. A composite image apparatus as claimed in claim 2, wherein the physical background is a surface of a known visual appearance, and the virtual background is selected to visually match the physical background.

25 4. A composite image apparatus as claimed in claim 2 or 3, wherein the image processing means comprises means for forming an intermediate image by joining one or more boundaries of the subject image with the virtual background.

30 5. A composite image apparatus as claimed in claim 4, comprising joining means for joining the subject image to the virtual background to create an enlarged intermediate image area.

- 12 -

6. A composite image apparatus as claimed in claim 5, wherein the joining means operates on data representing the subject image and on data representing the virtual background.

5

7. A composite image apparatus as claimed in claim 6, wherein the joining means joins the subject image to the virtual background by color matching adjacent pixels along a boundary line.

10

8. A composite image apparatus as claimed in any of claims 5 to 7, wherein said camera means comprises means for forming said subject image having a substantially rectangular outline, and wherein one edge of said subject image is joined by said joining means to a corresponding edge of said virtual background.

15

9. A composite image apparatus as claimed in claim 8 wherein the one edge is a side edge of the subject image and the corresponding edge is a side edge of the virtual background.

20

10. A composite image apparatus as claimed in any of claims 4 to 7 wherein more than one edge of the subject image is joined to the virtual background.

25

11. A composite image apparatus as claimed in claim 10 wherein a rectangular subject image is joined by 2, 3 or 4 boundaries to the virtual background according to the size of field required in an eventual composite image.

30

12. A composite image apparatus as claimed in claim 11 wherein the rectangular subject image is joined along all

- 13 -

boundaries such that the subject image is placed within the virtual background.

13. A composite image apparatus as claimed any of claims 1
5 to 12 wherein said image processing means produces a composite image by superimposing said foreground image section over an intermediate image comprising said subject image.
14. A composite image apparatus as claimed in claim 13
10 wherein the foreground image section is a cut out image having an irregular outline.
15. A composite image apparatus as claimed in claim 13 or 14
15 when dependent upon any of claims 2 to 12 wherein the foreground image section is applied over only the virtual background.
16. A composite image apparatus as claimed in claim 13, 14
20 or 15 wherein the foreground image section is applied over any selected portion of the intermediate image to form the composite image.
17. A composite image apparatus as claimed in any of claims 1
25 to 16 comprising user input means for enabling a user to position the foreground image section with respect to the subject image.
18. A composite image apparatus as claimed in claim 17
30 wherein the user input means is any one or more of directional buttons, a keyboard, a joy stick, or a touch screen monitor.

- 14 -

19. A composite image apparatus as claimed in any of claims 1 to 18 wherein the image output means comprises temporary display means arranged to be viewed by the user in use.
- 5 20. A composite image apparatus as claimed in any of claims 1 to 19 wherein the image output means comprises means for producing a physical visual output in permanent form.
- 10 21. A photobooth comprising a composite image apparatus as claimed in any of claims 1 to 20.
- 15 22. A photobooth as claimed in claim 21 wherein said camera means is arranged to be directed towards a user of the photobooth as said subject before a predetermined physical background.
23. A photobooth as claimed in claim 22 wherein the physical background comprises a rear surface of the photobooth.
- 20 24. A composite image apparatus substantially as hereinbefore described with reference to the accompanying drawings.
- 25 25. A photobooth substantially as hereinbefore described with reference to the accompanying drawings.

15

Amendments to the claims have been filed as follows

1. A composite image apparatus for use in a photobooth, comprising:

5

camera means for forming a subject image of a subject with a physical background;

10 selecting means for selecting a virtual background appropriate to the physical background;

joining means for forming an enlarged intermediate image by joining one or more boundaries of the subject image with the virtual background;

15

image processing means for forming a composite image by combining a foreground image section over the intermediate image; and

20

image output means for producing a visual output of the composite image.

25

A composite image apparatus as claimed in claim 1, wherein the physical background is a surface of a known visual appearance, and the virtual background is selected to visually match the physical background.

30

A composite image apparatus as claimed in claim 2, wherein the joining means for joining the subject image to the virtual background creates an intermediate image of larger area than the subject image.

16

4. A composite image apparatus as claimed in claim 1, 2 or 3, wherein the joining means operates on data representing the subject image and on data representing the virtual background.

5

5. A composite image apparatus as claimed in claim 4, wherein the joining means joins the subject image to the virtual background by color matching adjacent pixels along a boundary line.

10

6. A composite image apparatus as claimed in any of claims 1 to 5, wherein the camera means comprises means for forming the subject image having a substantially rectangular outline, and wherein one edge of the subject image is joined by the joining means to a corresponding edge of the virtual background.

7. A composite image apparatus as claimed in claim 6 wherein the one edge is a side edge of the subject image 20 and the corresponding edge is a side edge of the virtual background.

8. A composite image apparatus as claimed in any of claims 1 to 7 wherein more than one edge of the subject image is 25 joined to the virtual background.

9. A composite image apparatus as claimed in claim 8 wherein a rectangular subject image is joined by two, three or four boundaries to the virtual background according to 30 the size of field required in an eventual composite image.

10. A composite image apparatus as claimed in claim 9 wherein the rectangular subject image is joined along all

boundaries such that the subject image is placed within the virtual background.

11. A composite image apparatus as claimed any of claims 1
5 to 10 wherein the image processing means produces a composite image by superimposing a foreground image section over the intermediate image comprising the subject image.

12. A composite image apparatus as claimed in claim 11
10 wherein the foreground image section is a cut out image having an irregular outline.

13. A composite image apparatus as claimed in any of claims 1 to 12 wherein the foreground image section is applied
15 over any selected portion of the intermediate image to form the composite image.

14. A composite image apparatus as claimed in any of claims 1 to 13 wherein the foreground image section is applied
20 over only the virtual background.

15. A composite image apparatus as claimed in any of claims 1 to 14 comprising user input means for enabling a user to position the foreground image section with respect to the
25 subject image.

16. A composite image apparatus as claimed in claim 15 wherein the user input means is any one or more of directional buttons, a keyboard, a joy stick, or a touch
30 screen monitor.

18

17. A composite image apparatus as claimed in any of claims 1 to 16 wherein the image output means comprises temporary display means arranged to be viewed by the user in use.

5 18. A composite image apparatus as claimed in any of claims 1 to 17 wherein the image output means comprises means for producing a physical visual output in permanent form.

10 19. A photobooth comprising a composite image apparatus as claimed in any of claims 1 to 18.

15 20. A photobooth as claimed in claim 19 wherein the camera means is arranged to be directed towards a user of the photobooth as the subject before a predetermined physical background.

21. A photobooth as claimed in claim 20 wherein the physical background comprises a rear surface of the photobooth.

20 22. A method of forming a composite image, the method for use in a photobooth, the method comprising the steps of:

25 forming a subject image of a subject against a physical background;

selecting a virtual background appropriate to the physical background;

30 forming an enlarged intermediate image by joining at least one edge of the subject image to the virtual background;

19

forming a composite image by combining a foreground image section over the intermediate image; and

producing a visual output of the composite image.

5

23. A method as claimed in claim 22, wherein the virtual background is selected to visually match the physical background.

10 24. A method as claimed in claim 23 wherein the intermediate image is formed by colour matching adjacent pixels along a boundary line between the subject image and the virtual background.

15 25. A method as claimed in any of claims 22 to 24, wherein the subject image is substantially rectangular and is joined by one, two, three or all four boundaries to the virtual background according to the size of field required in the composite image.

20

26. A composite image apparatus substantially as hereinbefore described with reference to the accompanying drawings.

25 27. A photobooth substantially as hereinbefore described with reference to the accompanying drawings.

28. A method of generating a composite image, substantially as hereinbefore described with reference to figures 2 to 6
30 of the accompanying drawings.



The
Patent
Office
©

Application No: GB 9816175.5
Claims searched: 1 to 25

Examiner: John Donaldson
Date of search: 23 November 1998

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK CI (Ed.P): H4F(FAAG, FGH, FGJ, FGT)

Int CI (Ed.6): H04N 5/00, 5/222, 5/262, 5/272, 7/00, 7/18, 9/00, 9/64, 9/74, 9/75

Other:

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2320638 A (EASTMAN KODAK), see page 7, line 11 to page 8, line 5	1, 2, 4 to 6, 10, 13 to 23
X	GB 2270605 A (PHOTO-ME), see page 2, line 27 to page 4, line 7	1, 2, 4 to 6, 10, 13 to 23
X	GB 2242592 A (PHOTO-ME), see page 4, line 1 to page 6, line 8	1, 2, 4 to 6, 10, 13 to 23
X	GB 2235347 A (BARBER), see page 8, line 1 to page 9, line 2, page 10, line 5 to page 11, line 3, page 12, line 7 to page 13, line 11	1, 2, 4 to 6, 8 to 23
X	WO 90/10251 A1 (BARCREST), see page 13, line 13 to page 16, line 15	1, 2, 4 to 6, 10, 13 to 23

X Document indicating lack of novelty or inventive step	A Document indicating technological background and/or state of the art.
Y Document indicating lack of inventive step if combined with one or more other documents of same category.	P Document published on or after the declared priority date but before the filing date of this invention.
& Member of the same patent family	E Patent document published on or after, but with priority date earlier than, the filing date of this application.

THIS PAGE BLANK (USPTO)